Log Event B

Borehole # 41-04-07

Borehole Information

Farm : SX	**Tank :** SX-104	**Site Number :** 299-W23-62
N-Coord : 35,405	**W-Coord :** 75,695	**TOC Elevation :** 667.99
Water Level, ft :	**Date Drilled :** 9/30/1954	

Casing Record

Type : Steel-welded	Thickness : 0.313	ID, in. : 8
Top Depth, ft. : 0	Bottom Depth, ft. : 101	

Borehole Notes:

Borehole 41-04-07 was drilled in September 1954 to a depth of 101 ft with 8-in. casing. The casing thickness is presumed to be 0.313 in., on the basis of the published thickness for schedule-40, 8-in. steel tubing. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. The drilling log reports that the borehole casing was perforated from 10 to 99 ft. Information contained in the Tank Summary Data Report for tank SX-104 (DOE 1995a) indicates that this borehole was not grouted or modified.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 10/1997	**Calibration Reference :** GJO-HAN-20	**Logging Procedure :** MAC-VZCP 1.7.10-1

Logging Information

Log Run Number : 1	**Log Run Date :** 01/20/1998	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 0.0	**Counting Time, sec.:** 50	**L/R :** L **Shield :** N
Finish Depth, ft. : 42.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 01/21/1998	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 99.0	**Counting Time, sec.:** 50	**L/R :** L **Shield :** N
Finish Depth, ft. : 41.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Logging Operation Notes:

This borehole was logged by the SGLS in two log runs. The top of the casing, which is the zero reference for the SGLS, is approximately 4 in. above the ground surface. The total logging depth achieved was 99 ft. The 50-s counting time used to log this borehole was half of that normally required because this is a repeat log that was run to determine if there has been any changes in the vadose zone contamination.

Analysis Information

Analyst : E. Larsen

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 02/05/1998

Analysis Notes :

The post-survey field verification spectra for each logging run met the acceptance criteria established for peak shape and system efficiency; however, one of the pre-survey verification spectra failed to meet this criteria. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

The casing correction factor for a 0.33-in.-thick steel casing was applied to the concentration data.

Shape factor analysis provides insights into the distribution of the Cs-137 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides. A 50-s counting time used during this logging event (Event B) resulted in counting statistics that were inadequate to produce reliable shape factor results. Therefore, spectra collected from the initial logging event (Event A) in 1995, which utilized a 100-s counting time, were used to generate shape factor results for this borehole.

Log Plot Notes:

A data plot is presented that compares the SGLS data collected during the baseline logging event (Event A) in May 1995 with the SGLS data collected during the subsequent monitoring event (Event B) in January 1998. The man-made radionuclide data and the total gamma activity derived from the spectral data from each event are used in the data comparison. Uncertainty bars and MDLs are not included on these plots.

A separate log plot shows the variations in the volumetric moisture content of the sediments surrounding this borehole. Uncertainty bars on the plot show the counting uncertainties for selected measurements as the 1-sigma (68%) confidence intervals.

A plot of the spectrum shape factors is also presented. The plot is used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole.

A combination plot includes the SGLS man-made and natural radionuclide data and the total gamma activity derived from the spectral data. Also included is the profile of the volumetric moisture content derived from the neutron count-rate data.

Results/Interpretations:

As described previously, the 1998 SGLS data were collected using a 50-s counting time, which is half of that

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normally used. This resulted in a MDL that was higher than the MDL associated with the baseline log data collected in 1995. Consequently, numerous zones of very low Cs-137 contamination between 2 and 96 ft that were detected in 1995 were not detected in 1998. Accordingly, the distribution of the man-made radionuclide contamination detected by the SGLS in 1995 is discussed below.

The man-made radionuclide Cs-137 was detected in this borehole. Numerous zones of isolated and continuous Cs-137 contamination were detected from the ground surface to the bottom of the logged interval (99 ft).

The comparison of the 1995 and 1998 SGLS data shows excellent repeatability of the Cs-137 profiles near the surface and at the bottom of the logged interval, and generally good repeatability in areas where Cs-137 was detected in both 1995 and 1998. There is no indication of an increase in contamination in the vadose zone sediments surrounding this borehole since 1995; thus, there is no indication of a tank leak in this region.

Additional information and interpretations of the log data are provided in the Tank Summary Data Report and Vadose Zone Reassessment Report for tank SX-104.